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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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A SCIENCE SERVICE PUBLICATION

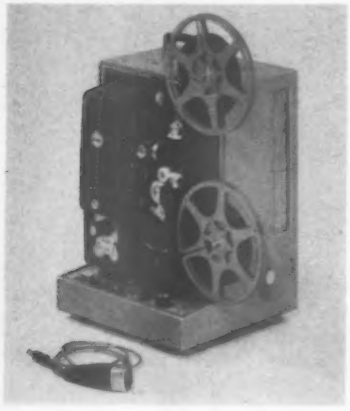
Kodak reports on:

walking a .030″ fence to communicate by sight and sound . . . lenses for the new phosphors

The paradox of 8

How would you like a good sound recorder that also shows movies? For $345 list.

Make your movies with a regular 8mm camera. If you want a suggestion, it could be a Brownie Movie Camera, which starts as low as $24.50 list. Have your film processed. Either then or after editing, have the dealer send it to us for *Kodak Sonotrack Coating*, a magnetic stripe .030″ wide between the sprocket holes and the edge of the film. Project with the new *Kodak Sound 8 Projector* and into the little microphone speak your comments. In case of afterthoughts, solecism, or fuzzy rhetoric, hit the knob (excellent brakes) and the "record" switch, reverse, throw into forward, and record



again. This takes care of erasing. Start again in the middle of a sentence if you wish. No waiting to reach recording speed. Project again to listen back. When completely satisfied with telling the story in English, you can erase and retell it on the same film in the Luganda tongue.

This is quite a system of communication. Use it to instruct your Swaziland branch office. Report to the home office on whether the breakwater at Pago Pago needs rebuilding and how the swallows come in for the landing at Capistrano. Save days of literary toil. What few words the movies leave to be said are more convincing when heard in accompaniment to the sight of the action. (As for combined records of the children's voices and swiftly changing ways, shame on sentiment!)

We owe you an explanation of why you have heard very little hitherto about 8mm sound movies. A paradox bedevils the manufacturer. To yield accustomed quality of performance, he has to build the machine more than twice as good as a 16mm sound rig, but he is expected to sell it for less than half the price. For accomplishing this, they don't even award Nobel Prizes.

Because of the very small width of the magnetic stripe and the relatively high tracking force, the magnetic head must be hard physically so that the gap shall not wear down to another dimension and thus lose sound quality. At the same time it must be soft magnetically to conduct but not retain flux.

We wish we could boast that the practically wear-proof aluminum-iron alloy we use for the .020″-wide head was developed by us, but actually it was developed by the Naval Ordnance Laboratory for their own purposes. We do, though, lay claim to the credit for a system that gives 70 to 5500 cycles/sec frequency response while running at only 2.4 inches/sec—as at 16 frames/sec. It does even better at 24 frames/sec speed. We went to some lengths, engineeringwise, to provide the latter speed when we heard that some segments of the motion picture industry might be offering 8mm rental prints of their theater releases.

Demonstrations cheerfully given where the "Kodak" sign is displayed. Say distinctly: Kodak Sound 8 Projector.

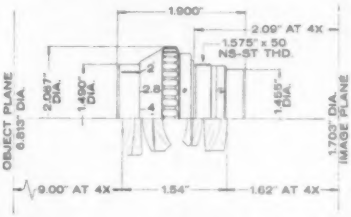
Heat from the tubes

Create a stream of electrons, focus them into a sharp pencil, and write or draw with it. Great Zeus! *There* is an idea worth noting in the history of man's climb upward from the slime! Whither it will lead tomorrow can only be guessed at. Today there are contracts to be fulfilled (and possibly money to be made) by finding a lens to image some smart writing from a cathode-ray tube to photographic material and then doing something further smart from there.

A lens? It so happens that you have come to the right place, you there with the black boxes. Your suspicion may well be justified that the old photo-enlarging lens which images your c-r tube on a piece of drugstore film could be missing some of the voluminous detail being poured forth so ferociously by your black boxes. (Better not to disclose what happens in them. Kodak, too, makes mysterious black boxes. It's the American way.)

Formula M-236 is our designation for a beaut of a lens. It represents our response to the heat being put on our end of the c-r recording business by the tube makers. As long as their phosphors couldn't show any finer detail than 10 lines per millimeter on the tube face, it was silly to fuss over the lens. Now that they can put down 100 lines per millimeter, a basic fact of lens design must be faced. A lens designed for distant objects, as most photographic lenses are, cannot function at its best for 4:1 reduction.*

M-236 is designed for 4:1 reduction. Here, for the guidance of the man who needs to design equipment around the finest cathode-ray tube lens currently available on special order, and to the intense boredom of the man who doesn't, are the dimensions:



The lens is achromatized for P-16 phosphor. When the diaphragm is wide open to the *f*/2.0 mark, the edge of the 1.700″-diameter image gets 35% as much illumination as the center. If that image size is too small, or if you use P-11 instead of P-16, we have several other c-r lens designs of longer focal length and for lesser reduction.

As to the resolution, we could quote a lot of numbers that are obviously supposed to make your jaw hang slack but don't mean a thing until you pick the film to use with the lens. For this you must be prepared to answer questions on how much voltage to light the tube, how much time to record, how many seconds to process (!), how to be read, etc.

Then you get in touch with Eastman Kodak Company, Special Products Division, Rochester 4, N. Y. No obligation, of course, but what did you say the color of your money was?

*Visitors to Rochester are sometimes permitted a glimpse at a mathematician of ours who thinks, after some years of immersion in matrix algebra, that by and by he will be able to write a computer program which, for any set of circumstances whatever, will design the best possible lens.

Prices quoted are subject to change without notice.

Kodak

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

PSYCHOLOGY

Brain Cell's Signals Heard

Electrical activity of single nerve cells has been studied. Primitive areas of the brain that control certain glands and a machine that understands speech are reported.

SCIENTISTS have been able to tune in on the electrical activity of single nerve cells in the brain, Dr. Edward V. Evarts of of the National Institute of Mental Health, Bethesda, Md., reported to the National Academy of Sciences meeting in Washington, D. C. He has studied the effects of sleep and waking on this activity.

The "brain waves" that have been studied by scientists in recent years result from the signals "broadcast" by many nerve cells sending out impulses in unison.

Many single nerve cells in the brain, like the "chorus" of nerve cells, show considerable "spontaneous" activity during sleep. When the person awakes, this characteristic spontaneous activity is reduced in many nerve cells.

When the senses pick up signals from the surroundings, as when you are reading or listening, there are after-effects that also interfere with the spontaneous nerve cell activity. These after-effects of sense signals are naturally more marked during the waking state than during sleep.

The result of curbing the spontaneous activity of nerve cells during wakefulness may serve to allow the brain to respond more accurately to things going on in the surroundings, Dr. Evarts indicated.

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Control Secretions

AREAS have been found in the most primitive part of the brain's cortex that control the secretions of certain endocrine glands, Dr. John W. Mason of the Walter Reed Army Institute of Research said in another report to the National Academy of Sciences meeting in Washington, D. C.

The two areas are known to anatomists as the hippocampus and the amygdaloid complex. The part of the brain in which they are located is called the limbic system. The amygdaloid complex acts to stimulate the secretion of ACTH which, in turn, causes release of cortisone from the adrenal glands.

Hydrocortisone, when secreted in the body, has a vital role in the production of energy for use by the body. Administered by a physician, it is an important remedy for painful rheumatoid arthritis and other diseases.

The other newly studied area, the hippocampus, acts to suppress the ACTH secretion. Dr. Mason reported.

Science News Letter, May 7, 1960

X-RAY OF THE SUN—First X-ray photograph of the sun has just been made by Richard L. Blake of the U.S. Naval Research Laboratory. The photograph was made from an Aerobee-Hi rocket launched from the White Sands Missile Range, New Mexico (see story p. 292).

Man Has Three Brains

MAN HAS THREE brains. Although very different in construction, these three brains must work together. The oldest of these brains is basically reptilian, Dr. Paul D. MacLean of the National Institute of Mental Health, Bethesda, Md., reported to the National Academy of Sciences meeting in Washington, D. C.

Man's second brain is inherited from lower mammals. The third brain is a late mammalian development that has made man peculiarly man.

The lower mammalian brain, which we share with all mammals from mouse to man, manufactures the feelings that guide behavior essential to self-preservation and the survival of the species. When the site of this second brain in the limbic lobe surrounding the brain stem is stimulated electrically or chemically, sexual behavior results.

The second brain is also responsible, through our feelings, for our sense of reality.

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Machine "Hears" Speech

A machine that can "understand" ten spoken syllables has been built and used to develop better ways for man actually to control machines vocally.

Dr. Harry F. Olson of RCA Laboratories, Princeton, N. J., told the National Academy of Sciences meeting in Washington, D. C., that the device is called a "phonetic typewriter." It has helped scientists aim research toward ways to analyze and identify speech and to code and decode it.

Dr. Olson suggested the day is coming when a factory hand may command his production-like machine vocally as well as with hands and feet. Also, he said, phonetic typewriters may be used to feed information into computers, perhaps as a human investigator reads figures from a chart.

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Ulcers Not From Cortisone

CORTISONE does not cause ulcers in the upper intestine, scientists at the National Academy of Sciences meeting, Washington, D. C., were told.

Dr. Lester R. Dragstedt of the University of Florida said that most doctors and

research workers agree that ulcers of the upper intestine, or duodenum, are usually caused by an abnormal over-secretion of gastric juice resulting from mental or physical stress. But there has been considerable dispute about the causative mechanism.

One recent concept tried to explain the puzzle by stating that the hypothalamus, a part of the brain, stimulates the pituitary gland which releases adrenocorticotropic hormone, ACTH. This hormone goes to the adrenal gland and causes increased production of cortisone, which is claimed to cause gastric secretion and duodenal ulcer.

Dr. Dragstedt said his research showed that ACTH, cortisone and epinephrine do not stimulate gastric secretion. He also found that nervous tensions do not stimulate such secretion if the vagus nerves have been cut. The vagus nerve begins in the brain and has branches going to various organs.

He suggests that the stresses of modern life play an important role in duodenal ulcer by causing, in some way, an increased activity of the vagus nerves. This in turn causes an increase in stomach motility and the over-secretion of juices results.

Science News Letter, May 7, 1960

ASTRONOMY

Nova Turns Neutron Star

A BIT of matter the size of a dust grain in a neutron star would weigh more than the biggest ship.

Many scientists now believe that the left-over core from a supernova turns into a "neutron star," Dr. E. E. Salpeter of Cornell University reported at the National Academy of Sciences meeting in Washington, D. C.

It is generally thought that supernovae explode because of the sudden collapse of a star. The remaining core is believed to turn into a white dwarf star that consists mainly of ionized iron at densities of 1,000,000 grams per cubic centimeter. These dwarf stars are about the size of the sun but not as bright.

Dr. Salpeter said he believed this core is similar to that of a white dwarf but of much greater density. When the concentration in this type star reaches densities of of about 100 billion grams in each cubic centimeter, the electrons have built up to such pressures that beta decays begin. The result is that common elements like iron are are first transformed into heavy and transuranic elements rich in neutrons. At even higher densities they are changed into free neutrons.

During the cooling process of these stars, the densities go as high as 1,000 million million grams per cubic centimeter. As its interior cools, the brightness of this type of star would decrease from about a thousand times that of the sun to about one-hundredth the sun's brightness. The temperature at its center is then comparable to that of the sun or a white dwarf.

At this point, the star may have a surface temperature of about half a million degrees and much of the light emitted would not be visible but a type of radiation called "soft X-rays," Dr. Salpeter said. It is possible that these rays might be observable directly from outside of the earth's atmosphere.

Science News Letter, May 7, 1960

Tiny Pieces of Comets

ALL THE "shooting stars" bright enough to be seen by the naked eye are caused by tiny pieces of comets hurtling through the earth's atmosphere.

Comets also supply most of the tiny particles known as meteoroids that may be a danger to operating space vehicles, Dr. Fred L. Whipple, director of the Smithsonian Institution's Astrophysical Observatory, Cambridge, Mass., reported to the National Academy of Sciences in Washington, D. C. The definite determination of the source of meteors in the visual range is based on analysis of several hundred meteor photographs taken with the Baker Super-Schmidt cameras in New Mexico. The cometary meteors are extremely fragile, and the density varies greatly from one meteor to another.

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X-ray of Sun Shows Halo

THE FIRST X-ray photograph of the sun, showing it ringed by a bright X-ray halo, was shown to scientists at the National Academy of Sciences meeting in Washington, D. C. (See picture p. 291.)

Dr. Herbert Friedman of the U. S. Naval Research Laboratory reported that this unique photograph was taken from an Aerobee-Hi rocket carrying an especially designed camera more than 130 miles above the earth's surface. The photograph shows not only the bright X-ray halo but several spots of intense X-ray emission distributed over the solar surface.

The sun's visible disk has a surface temperature of some 10,000 degrees Fahrenheit. Extending high above the disk is a thin outer atmosphere known as the corona. Because its brightness is only a millionth of the visible surface, about equal to that of the full moon, the corona can be seen only during a total eclipse or by special instruments, at which time it appears to stretch millions of miles into space.

Although very tenuous, the corona gas is very hot, averaging about a million degrees, with hot spots of perhaps some 10 million degrees.

Dr. Friedman said that the bright ring around the solar disk represents the thickness of the coronal gas from which X-rays are emitted. Virtually all of the X-ray emission is confined to a height of about one-fifth the solar radius above the surface.

Dr. Friedman also reported that the earth itself has a corona, called the geocorona. Neutral hydrogen from the photochemical action of sunlight on water vapor and methane near the 50 to 60 mile level of the atmosphere forms this earthly corona at times of disturbances in the earth's magnetic field.

At these times a stream of ionized gas approaching the earth from the sun runs into the barrier of the earth's magnetic field, which exerts a magnetic pressure against the stream, opposing its advance and forming a concave distortion in the stream's surface. At the same time, the stream squashes the earth's magnetic field. Resulting reactions cause the stream to flow around the earth, completely enfolding the earth's magnetic field.

The cavity thus formed inside the stream behaves like an elastic balloon inflated with the water vapor and methane. When the sun shines on the neutral hydrogen contained within this corona, it glows with invisible ultraviolet light.

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PHYSICS

Natural Mars Satellite

THE NATURAL satellite that circles close to Mars could serve as an ideal observation platform from which to view that planet, the American Physical Society meeting in Washington, D. C., was told.

Dr. S. F. Singer of the University of Maryland said this inner satellite, known as Phobos, acts as a "sweeper" to wipe out dangerous radiation in a region around Mars. He believes that both Mars and Venus are surrounded by natural radiation belts, as the earth is.

Astronauts on trips to Venus or Mars may have to face the hazards of such belts not only when leaving the earth but when landing on other planets.

Dr. Singer said the discovery of the earth's natural radiation belts indicates that any planet with a magnetic field and an atmosphere must possess radiation belts. His calculations showed that the inner belt of Mars or Venus would be just as "undesirable a place to be as the inner radiation belt of the earth."

Since the solar particles causing the outer belt thin out through space, Venus will receive twice as many particles as the earth, while Mars intercepts less than half this amount.

For this reason, he reported, the maximum of the outer belt will be some 16% farther from the Martian surface than the outer belt of the earth, while the outer belt of Venus is slightly more than 10% closer to the surface.

In 1956 Dr. Singer predicted the existence of trapped particles in the earth's magnetic field to explain some puzzling features of auroras and magnetic storms. Magnetic storms are violent disturbances in the earth's magnetic field that can be detected by such instruments as a sensitive compass needle. They are produced by an electric current flowing outside of the atmosphere.

This and later predictions were verified by the United States Pioneer and the Russian lunar rockets. Recent measurements have shown that the earth's outer belt is quite complicated, Dr. Singer said, and consists of several varying layers.

Dr. Singer reported that the measured intensities in the earth's inner radiation belt agreed so well with theory that they are now being used to give information about the atmospheric density in a region never previously available to direct measurements.

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Insight on Living Matter

A NEW KIND of nuclear reactor that works at extremely low temperatures may give biologists a new tool for studying living matter.

Dr. Lyle B. Borst, chairman of New York University's physics department, told a news conference at the American Physical Society meeting in Washington, D. C., that such a reactor could be built with only a few ounces of uranium-235, instead of the more than two pounds now needed. The reactor would yield a neutron stream for measurements of objects at wavelengths not presently available for easy study. Such things as molecules, bacteria and viruses could be looked at with this new device, either in solution or in culture.

The reactor would consist of uranium-235 and ordinary water as ice kept at a temperature within eight degrees Fahrenheit of absolute zero, which is 459.7 degrees below zero.

Dr. Borst said he had successfully cooled neutrons to the eight-degree temperature for the first time.

At these low temperatures, most materials show nearly ten times the ability to capture neutrons as they do at room temperatures.

Using the very cold neutrons as a measuring stick means distances of a ten-millionth of an inch can be determined.

Dr. Borst said that the new kind of reactor would also be useful in laboratory studies of the operation of nuclear satellite power plants under emergency conditions. Such plants if built of presently used materials might conk out at the low temperatures found in outer space far from a star or in the shadow of a planet.

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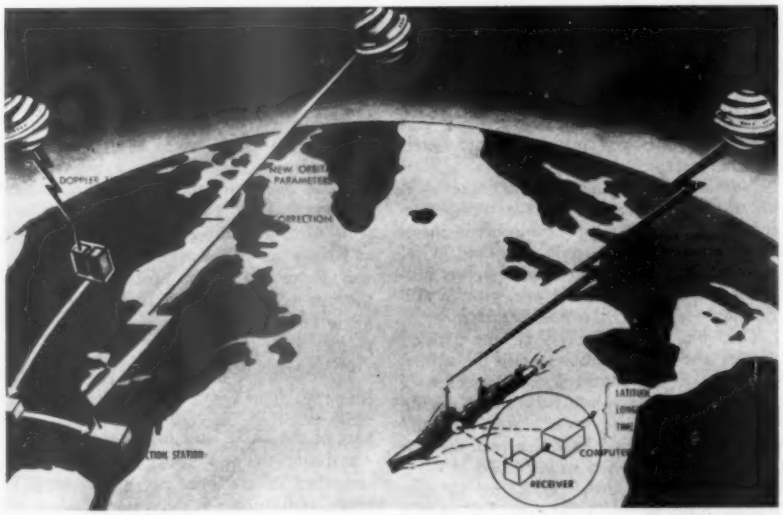

TRANSIT NAVIGATION—Doppler signals from the navigational satellite Transit I are picked up (left) by receiving station which transmits them to central computer center. Future paths of the satellite are predicted from these data that are then relayed to injection station and transmitted back to the satellite (center). The satellite beams data back to earth (right). Ship navigators correlate the position of the satellite with current Doppler shift data to determine their position on earth.

GEOPHYSICS

Jupiter Explosions Equal H-Bomb Every Second

THE PLANET Jupiter is sending out radio waves showing the explosion causing them is the earthly equal of a 100-megaton hydrogen bomb exploded every second.

The radiation, however, is definitely not due to H-bomb explosions on Jupiter, scientists at the American Geophysical Union meeting agreed. Its exact source is still a mystery as well as a source of serious disagreement.

There are at least five main spots on Jupiter from which the radio waves have been detected, Dr. Roger K. Gallet of the National Bureau of Standards Boulder Laboratories in Colorado, said. The energy of these radio waves is only a millionth part of the total that must be generated on Jupiter because the energy transformation process is very inefficient. The total amount of energy on the planet is calculated to be the equivalent of 10 hydrogen bombs each second in each of at least five regions, or some 10 to the 24th power ergs.

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MEDICINE

Fungus Lung Disease Treated by Surgery

COCCIDIOIDOMYCOSIS of the lungs, a fungus disease resembling tuberculosis, may be treated successfully by surgery, an 18-hospital cooperative study by the Veterans Administration and the Armed Forces reveals.

The research shows that, with proper selection of cases and attention to medical detail, complications of surgery for pulmonary coccidioidomycosis are no greater than complications of surgery for TB of the lungs.

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ARCHAEOLOGY

U.S. History Preserved

THE ANCIENT history of the United States is being preserved and will "not disappear forever from the face of the earth."

This saving of irreplaceable treasures results from a cooperative program of Government, scientific and construction agencies, supported by Congress, Dr. J. O. Brew, director of Harvard University's Peabody Museum, reported to the American Philosophical Society meeting in Philadelphia.

Population growth all over the world, he said, has always been a threat to the preservation of historical and archaeological items. For thousands of years, civilizations have wrecked the buildings of previous generations to make way for "modern" structures. Athens, Rome, Cairo, Damascus and New York, Dr. Brew said, have all seen this process.

However, to meet the threat resulting from the unprecedented rural and urban developments of the 20th century, the idea of salvage archaeology developed. Since not all old buildings, information or artifacts can be saved, the idea of salvage archaeology is to survey and record. Carefully planned, Dr. Brew reported, this does not impede progress, and occasionally an alternative route for a road or dam will be fund to save a threatened monument.

In 1945, a group of archaeologists realized the tremendous amount of destruction to result from the river basin projects of the Bureau of Reclamation and the Corps of Engineers. The cooperative program developed to meet this threat resulted in "noteworthy and exciting" increases in knowledge of the prehistoric and historic past, Dr. Brew said.

Information previously unknown is available through this program, which is now far more than a rescue operation to save individual sites and buildings. Geologists, paleontologists, botanists and zoologists have joined with archaeologists and historians to produce ecological studies of major river valleys in the U. S. Physical scientists have aided with their new dating methods.

"Many fields of knowledge are, therefore, bringing their resources to bear to make the program a truly interdisciplinary one and to insure that the historic record does not disappear forever from the face of the earth," Dr. Brew concluded.

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Law Covering Sensations

WHEN LIGHTS, sounds and skin vibrations vary in strength, the resulting sensations go up or down in apparent intensity, but not in the same proportion. New methods for measuring these resulting sensations were reported to the American Philosophical Society meeting in Philadelphia by Dr. Stanley Smith Stevens, Harvard University psychology professor.

He discovered his law by having various persons make personal estimates of the apparent degree of differing sensations under controlled conditions. First, experimental subjects were asked to adjust the intensity of a sound to make its loudness seem as strong as a vibration applied to the fingertip. When the vibration was changed, it was found that the apparent loudness grew more slowly than the apparent force of the vibration, if the two sensory stimulations were increased at the same rate.

Dr. Stevens has shown that his new law, demonstrating that sensations are a power not a logarithmic function, holds in some two dozen cases.

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PSYCHOLOGY

High Grades for Students Who Cry Peeling Onions

ANSWERS to such questions as whether onion-peeling brings tears to the eyes are clues to a student's grades, tests indicate.

Two Michigan State University psychologists, Gerald L. Hershey and Dr. Henry C. Smith, chose 200 out of 1,000 items from various personality tests and gave them to 110 male students.

From the answers they picked 38 questions that showed relationship to the students' grades rather than to intelligence. The 38 questions were then given to 140 other male students. The answers showed great relationship to these students' grades and practically none to intelligence.

When having to respond to the statement, "I rather often do worse at things than I expected to do," the students with good grades usually answered "false." Such statements as "Peeling onions very quickly brings tears to my eyes," and "I do not like to see women smoke," both brought the answer "true" from good students.

Since the relationship of personality to grades may differ between men and women, the test was developed for one sex only, males.

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CHEMISTRY

Manipulators Operate Radiochemistry Facility

See Front Cover

A MILLION-DOLLAR radiochemistry facility will make it possible for scientists to work with larger quantities of highly radioactive materials than before. Master-slave manipulators, like the one operated by Dr. J. L. Green (right), will lift 50 pounds vertically.

Located at the Atomic Energy Commission's Hanford laboratories, the radiochemistry facility was built by General Electric and will soon be in operation.

As larger amounts of material will be used, more conclusive results for chemists in the study of atomic waste treatment and recovery of fission byproducts, which have potential uses in medicine, agriculture and industry, are expected. Experiments in reprocessing of spent fuel will also be undertaken.

Other scientists in the picture on the cover of this week's SCIENCE NEWS LETTER are Dr. E. J. Wheelright (left) and J. C. Gibson.

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MEDICINE

USSR Medical Research

IN RUSSIA, the medical problem that gets the most attention is surgery of heart vessels and nerves.

Next in line, in order of their importance, are cancer, immunity to tissue transplants, infectious diseases and streptococcus infections, poliomyelitis, influenza and viral pneumonia, industrial diseases, aging processes including atherosclerosis, growth and development, radiation and leukemia.

Col. Joe M. Blumberg of the Armed Forces Institute of Pathology told the annual meeting of the International Academy of Pathology in Memphis, Tenn., that during his recent trip to the Soviet Union, he found the Russian medical facilities poor by our standards, even when newly built.

Some medical installations are in converted religious buildings, such as monasteries, he said. However, all essential laboratory equipment is available, either manufactured in Russia or imported from the satellites, western Europe and the United States. Some equipment, he said, is not generally available in the U.S. Examples cited are new tissue slicers that use refrigerant gas to freeze the tissue, and a two-headed microscope that permits simultaneous examination of two slides at the same time.

The intellectual ability of top Russian medical scientists, three-fourths of whom are women, is "excellent," Dr. Blumberg said. After ten years of pre-college education and six years in a medical institute, a Russian doctor is ready to practice medicine at the age of 22. This is the age at which many U.S. students enter medical school, he pointed out.

Ninety-five percent of the 16,000 doctors graduated each year remain in practice in the hospitals, dispensaries and institutes that are part of the USSR socialized medicine. The remaining five percent go on to become specialists after about six more years of work and study.

To provide an abundance of experimental animals for research, the Soviet Government has established large colonies of baboons and rhesus monkeys. Research conducted on these animals include studies in genetics and effects of radiation, hardening of the arteries and of coronary attacks.

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AGRICULTURE

Pesticide Use Studied

COORDINATED research between biologists and engineers is needed for the most effective use of pesticides, a U.S. Department of Agriculture engineer reported.

Dr. Walter M. Carleton of the Agricultural Research Service told a symposium on agricultural chemicals held at Beltsville, Md., that more efficient equipment for applying chemicals is needed, but engineers are hampered in developing such equipment by a lack of basic knowledge about the behavior of materials during and after application .

He said improved equipment to deposit chemicals in predetermined locations would increase the effectiveness of pesticides and reduce substantially the amount needed for optimum control. This, in turn, would reduce the cost to the farmer and reduce drift and residue hazards to man, animals, beneficial insects and crops.

Research has shown, Dr. Carleton said, that if equipment were available to apply pesticides to the proper location on tobacco, for example, optimum control of pests could be obtained with only one-fifth the recommended dosage.

The symposium also heard of the continuing livestock problem of industrial contamination of feed from Dr. Aubrey M. Lee, also of USDA's Agricultural Research Service.

While at this time no industrial contamination of livestock feed is known to be causing loss of livestock over wide areas, Dr. Lee pointed out, more must be learned about industrial processes, gases, wastes and additives in order to prevent their incorporation into feed.

Possible contamination of feed comes from industrial vapors and fumes that add fluorine, lead, arsenic and possibly other elements into the air. Industrial poisons, including carcinogens, get into feed, not only from air pollution, but also from lubricants used on agricultural machinery such as pelleting machines, Dr. Lee said.

Science News Letter, May 7, 1960

Tell How Plants React

WHAT HAPPENS to plants when treated with chemical growth regulators was reported by Dr. John W. Mitchell of the U.S. Department of Agriculture.

Such growth regulators are used in minute quantities—sometimes less than one teaspoon per acre—but can still induce growth responses in plants, Dr. Mitchell said.

He told a symposium on agricultural chemicals held at Beltsville, Md., that the fate of growth regulators in plants depends on many factors, such as temperature, humidity, the age and type of plant, and the type and quantity of chemical.

Plant-growth regulators, he said, must be absorbed by plants to be effective. How fast they are absorbed and translocated, or moved through the plant, can be changed by altering the structure of the chemical.

Dr. Mitchell and associates are also trying to determine what happens to therapeutants in plants. Used to cure plant diseases, therapeutants are of two kinds: those made chemically and those formed by organisms such as molds. Among such plant disease remedies are streptomycin, terramycin and other antibiotics.

It has been found that these therapeutants are readily absorbed by roots, stems, leaves and fruits of plants. Some change chemically while on the leaf and others change within the plant.

Science News Letter, May 7, 1960

MILITARY SCIENCE

Army, Marines Getting New Fuel-Cell Power

A PORTABLE fuel-cell power plant will be delivered to the U.S. Army Signal Corps and the U.S. Marine Corps soon. The power plant will have no major moving parts but will produce 200 watts of direct current at 24 volts.

It can be carried by a soldier on his back to power portable radar systems that can detect enemy movements through darkness and fog.

The new power unit, developed by General Electric Company, will weigh 30 pounds and will be about the size of a suitcase. Inside it will be 30 fuel cells.

Each cell works on oxygen from the air and hydrogen gas produced as the cell's fuel, a metal hydride, decomposes. The unit produces electricity as the fuel is consumed. The power unit never needs recharging. It needs just 72 pounds of fuel to do the work that otherwise would require half a ton of freshly charged batteries.

The Army Signal Corps in Washington, D.C., reports that an experimental model is due for delivery in May and developmental models in October. Nine units are to be delivered by December.

Fuel cells have been built experimentally before. But the new unit will be the first to be mass produced and made available to the military as a regulation unit.

Science News Letter, May 7, 1960

SEISMOLOGY

Small Quakes Often Worst

SO-CALLED "small" earthquakes, like the two that destroyed the town of Lar in Iran killing hundreds of people, can be much more devastating than great ones. Many great ones go almost unnoticed by the world if they hit in deserted spots, the U. S. Coast and Geodetic Survey reported.

While the world was awaiting news of the Iranian damage, the Coast and Geodetic Survey reported a much larger earthquake occurred in the South Pacific about 10 hours earlier. However, this quake is not believed to have caused great damage since no such reports are known to have been received.

The Iranian earthquakes struck on Sunday, April 24, four hours apart, and rescue workers and the Iranian Red Cross, called the Red Lion and Sun, were still recovering bodies about a week later. Farhad Sepahboudi of the Iranian embassy said that Lar is mainly an agricultural center.

The U.S. Coast and Geodetic Survey reported that the earthquakes had only registered slightly in Washington, D.C., and that they were probably near the surface.

Most earthquakes originate about 30 to 40 miles down although in a few spots, such as certain parts of South America and along the Sea of Japan and the Fiji Islands, quakes occur as far down as 500 miles.

Two major earthquake areas of the world are: the Circum-Pacific belt, including coastal areas around the Pacific Ocean; and the Tethus, or Alpine, Belt that ends at Agadir where a major earthquake occurred last February. This belt extends through Europe to Turkey and India and joins the Circum-Pacific Belt in Indonesia.

Earthquakes are caused by stresses in the earth's crust. This stress, of two blocks of rock formation rubbing against each other, is called shearing. No volcanic action can occur at the quake site because the rubbing blocks leave no room for molten materials to rise, if any are present. Volcanoes, often associated with earthquakes, lie on the landward side of the shallow earthquake zone.

Science News Letter, May 7, 1960

MILITARY POWER PACK—This model of General Electric's fuel cell power pack can be carried by hand or on a standard pack board. It was developed for the Marine Corps and the Army Signal Corps.

PSYCHOLOGY

More Chemistry Finds Made by Young Than Old

CHEMISTS make their most important as as well as their greatest number of discoveries when young, an Ohio University psychologist reports.

To reach this conclusion, Dr. Harvey C. Lehman studied 44 histories of chemistry by authors from Germany, France, England, Italy and the United States.

Statistics from the 44 histories showed that chemists become less productive as their age increased, he reports in the American Psychologist, 15:128, 1960. For example, in a five-year period 57 chemists aged 30 to 34 years made 19 of their best yearly reports of discoveries. The same chemists who lived until they were between 50 and 54 made only one contribution.

Dr. Lehman reports that although the work done by an older scientist is apt to receive more attention from historians since his name is known, it generally turns out that work done by the scientist in his younger years is the most significant. He cites Einstein as an example. Although Einstein received acclaim for work done in later years, the papers on relativity and light quanta that he did when he was about 25 are his most important.

Of 6,347 contributions made to chemistry each of which was mentioned in one only of the 44 histories, 94% were made by chemists at age 25 or older, 66% at 35 or older, 38% at 45 or older, 17% at 55 or older, and six percent at 65 or older.

Of 101 contributions each of which was mentioned in 20 or more histories, 95% were made at age 25 or older, 52% at 35 or older, 13% at 45 or older and one percent at 55 or older.

Science News Letter, May 7, 1960

PSYCHOLOGY

Study How Brain Signals May Influence Behavior

HOM MUCH the brain's electric signals have to do with the way an individual behaves is being studied at the University of California.

Dr. Walter J. Freeman is at work on a project in which he hopes to map the location of cerebral electric fields and to determine the extent of the relationships between brain waves and behavior. Experiments have already indicated some correlation, he reports.

Scientists have long known that a normal "noise" emanates from the mammalian brain in the form of tiny electric currents. They have recorded them by means of electrodes placed on the scalp and attached to an electronic instrument known as an electroencephalograph. The currents have thus been termed EEG waves.

Recent advances have made it possible to implant electrodes deep within the brain so that electrical activity in separate brain segments may be recorded.

EEG waves are now used in clinical study on humans to diagnose epilepsy and other brain disorders. Other researchers, working with animals, are looking for changes in EEG wave activity that may occur with learning.

Dr. Freeman, on the other hand, is mainly interested in the normal EEG wave patterns and in the spontaneous changes in brain "noise" occurring during different types of normal behavior.

He has implanted into cats under anesthesia up to 18 electrodes in a three-dimensional rectangular grid covering the surface and interior of the frontal lobe of the brain. Awakened and apparently unaware that they have been "wired for sound," the cats were connected to the electroencephalograph and their brain structures were searched for the predominant foci of electrical activity.

Guided by the cerebral "maps" thus obtained, Dr. Freeman is observing EEG wave activity during a whole sequence of normal behavior including sleep, exercise on a treadmill, fear, hunger and feeding. He is analyzing and measuring any changes he can detect in the electric patterns that appear to be related to behavior. Finally, he plans to compare results from different individuals to see whether any apparent "personality differences" in the cats can be detected.

Dr. Freeman has already established a significant link between electrical activity of the brain's prepyriform cortex and several behavioral states.

Science News Letter, May 7, 1960

ROCKETS AND MISSILES

"Inbred" U.S. Rockets To Enhance Space Success

AMERICA'S stable of work-horse rockets will be more and more inbred in the future. The idea will be to develop more sure-fire winners.

This is the policy to be pursued by the National Aeronautics and Space Administration, an NASA rocket engineer told a meeting in Washington, D. C. sponsored by the U.S. State Department.

Eldon W. Hall said NASA will seek to develop a few basic and reliable rocket engine units that can be put together in various numbers and ways to produce final space-going rockets with high reliability. He said, for instance, that the design of the second stage of one rocket could be modified and used as the third stage of another. He said this engine probably would be more likely to perform properly than a new, specially designed engine.

There also will be less emphasis on making United States rockets sophisticated, he said. Instead, NASA engineers will strive "to make them work." He said he thought Russia's rockets probably were more simple than those of the U.S., but could not say whether this had given Russia a smaller percentage of failures.

Ultimately destined to be put out to pasture, as far as the civilian space program goes, are the Juno II rocket and part of the Delta rocket, he said. NASA already has killed its Vega program in the interests of simplifying its space stable.

Science News Letter, May 7, 1960

IN SCIEN

AGRICULTURE

Radioactive Uptake From Soil Said to Be Small

THE AMOUNT of radioactive fallout products taken up by plants from soil is said to be "relatively small"—with most of it concentrated in leaves and to a lesser extent in fruits, seeds—or grain—and edible roots.

A study of uptake of fission products by plants from flats of soil exposed to contamination by nuclear detonations at the Nevada Test Site was carried out by Dr. H. Nishita, E. M. Romney and K. H. Larson of the Laboratory of Biophysics and Nuclear Medicine of the University of California Medical Center, Los Angeles.

They found that radioactive strontium was the fission product most readily taken up followed by radioactive iodine, barium, cesium, and ruthenium. Radioactive cerium, yttrium, promethium, zirconium and niobium were taken up only in trace amounts.

There were considerable differences in uptake of fission products among the plant species, kind of soil, and the conditions of plant growth. Of the plants studied, beans and radishes accumulated more radioactive strontium than carrots, lettuce, and barley in that order. In all plants, far more fission products accumulated in the leaves than in seeds or edible roots.

The addition of non-decayed organic matter to soil tended to inhibit uptake but it took unusually large amounts of it to make significant differences. Addition of calcium to soils deficient in calcium tended to inhibit the uptake of radioactive strontium. Similarly, the addition of potassium to potassium deficient soil inhibited the uptake up radioactive cesium.

Science News Letter, May 7, 1960

ASTRONOMY

Telescope in Nose Cone To Measure Ultraviolet

A NEW TYPE telescope, equipped with six photo-amplifiers, will be used to send television-type pictures back to earth of ultraviolet light from beyond the earth's atmosphere.

Scientists at University College, London, developed the flying telescope. It will be tested soon at Woomera range, South Australia, British Information Services reported. The telescope will be sent aloft 100 miles before the pictures are taken.

Dr. R. D. F. Boyd, in charge of the development of the telescope, expects it to take pictures of the ultraviolet spectrum never made before. New information about the atmospheres of stars is expected, and objects radiating invisible ultraviolet light may be discovered.

Science News Letter, May 7, 1960

E FIELDS

ASTRONAUTICS

No Space Suits Needed In 1965's Manned Moon

A SATELLITE with laboratory cells in which scientists can work without space suits might be put into orbit in 1965. It would be a step advanced from the Mercury program for orbiting a single man and a step forward toward more ambitious space travel.

Three engineers, John W. Dorsey, Michael Stoiko and Gerald G. Kayten, all of The Martin Company, Baltimore, Md., proposed such a satellite at a symposium in Los Angeles sponsored by the Institute of Aeronautical Sciences, The Rand Corporation and the National Aeronautics and Space Administration.

The enginers said the 16-ton laboratory is technically feasible. It would be capable of carrying four to six men. Personnel would not need elaborate space suits because a healthy, balanced atmosphere would be supplied to the whole satellite.

The satellite would be a double-shell, three-compartment cylinder. An outer shell, made of beryllium, would serve as a meteoroidal bumper and thermal shield. Mr. Dorsey said the satellite could have biological and chemical, astronomical and geophysical and medical laboratories. It could later be used for manned reconnaissance of the moon.

Science News Letter, May 7, 1960

ZOOLOGY

Epic Flight by Hoary Bat Started Hawaiian Species

SEVERAL thousand years ago, a pregnant bat lost her way in the northward spring migration and flew a record distance of 2,000 miles, all the way from the west coast of North America to Hawaii.

And that, says Dr. David H. Johnson, curator of mammals at the Smithsonian Institution, is probably how Hawaii acquired its bat population.

The animal was a hoary bat, a fairly common species in western North America. It has probably been in Hawaii for thousands of years, arriving long before man, Dr. Johnson says. During this time it has undergone various changes, but its relationship with the mainland bat is unmistakable.

Unlike most kinds of bats, the hoary bat is a solitary creature which roosts in trees and in winter migrates instead of congregating in caves. The female bears three or four young rather than the usual one or two. So it would have taken only one pregnant female to start the bat population in Hawaii, once she accomplished the almost miraculous feat of getting there, Dr. Johnson said.

The Pacific Islands have a very scanty mammal population. Most of the islands are coral atolls or the tops of volcanoes that that came into being long after mammals were well established on surrounding continents.

Warm-blooded animals could have reached the islands only by swimming, by hitching a ride with migrating man or by flying.

Of all these ways, Dr. Johnson noted, the least likely is flight—especially flight west over long stretches of sea, in which there are no islands to serve as resting places. Bats are the only mammals that could have arrived in this manner.

Although hoary bats are among the most efficient of flying mammals, they are poorly equipped for prolonged flight compared with birds.

And even for most feathered creatures, says Dr. Johnson, a non-stop journey of 2,000 miles would have been impossible.

Science News Letter, May 7, 1960

CONSERVATION

American Duck Numbers Are Down, Survey Shows

THE TOTAL North American duck population this year is 20% below what it was last year, the Department of Interior reports.

This information is based on the annual winter survey made by Interior's Bureau of Sport Fisheries and Wildlife. It includes the continent's four major flyways, or established air routes of migratory birds, the Pacific, Central, Mississippi and Atlantic Flyways.

The survey showed that in general the Arctic nesters, which were not affected by prolonged drought, were present in their usual numbers but that the prairie nesting waterfowl, which had been hit hard by three successive dry years, were in short supply.

Those species reported to have "held their own" or to have "increased slightly" are not necessarily in good shape, however, because 1959 was one of the very poor years for migratory waterfowl.

The redhead population dropped 73% below an already low 1959 level. Two other diving ducks, the canvasback and ruddy duck, were down 28% and 16% respectively. Other species showing decreases were mallards, down 22%; greenwinged teal, down 32%; bluewinged teal, down 44%, and pintails, down 27%.

The black duck population was not sufficiently high to get out of the "same as last year" category but wood ducks were up 17%.

Canada goose numbers were slightly down but snow geese were up 13% and the whitefronts up 10%. Brant numbers were up 100% on the Pacific coasts and up 10% on the Atlantic coast. All other species of migratory waterfowl retained their numbers of last year.

A total of 1,691 persons throughout North America participated in the survey, registering 100,027 miles by air, 106,990 miles by car and 4,047 miles by boat.

Science News Letter, May 7, 1960

ZOOLOGY

Whistling Swans Dyed To Study Migration Route

THE U.S. FISH and Wildlife Service has been dyeing whistling swans vivid colors to learn more about their migratory movements.

With their wings, tails or other body parts colored blue, yellow, green or red, the swans are easier to observe both when flying and resting on the ground. The Service is interested in determining over which states the birds fly in their annual migrations.

There are about 77,000 whistlers in the U. S. A little more than half of these winter along the Atlantic Coast, especially the Chesapeake Bay area, while the remainder winter along the Pacific Coast. The swans nest in Canada, roughly from Alaska eastward to Baffin Island.

Actually only a very small sampling of the whistling swan population is being dyed. This is because of the difficulty in trapping the four-foot-long birds. Mass dyeing, however, is not considered necessary.

The dyes used normally do not remain on the swans for very long. When the swans molt after nesting, they lose their colored feathers.

Allen Duvall of the Service's branch of wildlife research said dyeing techniques have been used previously with snow geese with satisfactory results. Persons who spot dyed whistlers are asked to report their observations to the Patuxent Wildlife Research Center, Laurel, Md.

Science News Letter, May 7, 1960

ASTRONOMY

Star's Unseen Companion Ten Times Jupiter's Size

THE UNSEEN companion of a "nearby" star may be a planet ten times the size of Jupiter.

Its mass is now believed to be one-hundredth that of the sun, Dr. Sarah Lee Lippincott of Sproul Observatory, Swarthmore College, Swarthmore, Pa., reported to the American Astronomical Society meeting in Pittsburgh.

The invisible object, however, may shine in the infrared by its own light. Only a special infrared observing program will allow astronomers to determine for sure whether the unseen companion of the star fourth nearest to earth, known as Lalande 21185, is a planet or another small star.

Dr. Lippincott has found that the object has an eight-year period. Astronomers are not sure whether or not this is the closest possible planet. Barnard's star is closer, but deciding the status of its companion is not possible at this time.

Astronomers can tell whether a star is single, like the sun, or a double or triple star, by examining its light with a spectroscope. The magnitude of Lalande 21185 is about seven, too faint to be seen without telescopic aid. It is 8.1 light years from earth, or some 48 million million miles. The star has been observed at Sproul Observatory since 1912.

Science News Letter, May 7, 1960

ARCHAEOLOGY

New Date With an Old Dish

Two archaeological dating methods will measure back at least 100,000 years, compared to the radiocarbon method using carbon-14 that is good for only about 40,000 years.

By TOVE NEVILLE

TWO ARCHAEOLOGICAL dating methods now enable scientists to date objects 60,000 years farther back in time than they have been able to do before.

One has so far been used to record the electron glow of dishes, vases and other pottery when heated; the other measures moisture layers in objects made of volcanic glass.

All materials contain traces of radioactive elements which emit radiation that traps electrons in solid crystals at ordinary temperatures. As this process progresses, the number of trapped electrons increases.

Drs. George C. Kennedy and Leon Knopoff of the University of California Institute of Geophysics, Los Angeles, heated pottery and lava rock to about 800 degrees Fahrenheit. At this point, trapped electrons are released and create a glow called thermoluminescence.

This glow is so faint that it is not visible, but it can be detected and measured by a photomultiplier tube. The more light emitted, the greater the length of time since the material was last heated to a temperature where it could give off electrons. In the case of a piece of pottery this would probably be when first fired or when last used in a hot fire.

The thermoluminescence technique could date objects up to about 100,000 years old. It has already been used to date 15,000-year-old lava rock from Arizona and ancient Greek pottery from the ninth century B.C., or about the time when Homer was writing the Iliad.

Dates for Prehistoric Societies

This dating method will be especially valuable in establishing dates and time sequences for prehistoric societies that have left no materials containing carbon, such as charcoal or wood, which can be dated by the radioactive carbon method.

It will also help establish correct chronology of varying styles and shapes of pottery. Archaeologists most commonly use a comparative dating method by considering such things as development of craftsmanship, decoration and design. The thermoluminescence technique can now be used to verify or correct the archaeologist's chronology. It is expected to be used next in dating Mayan and Mexican pottery.

The other new dating method was discovered by Drs. Irving Friedman and Robert L. Smith of the U.S. Geological Survey. By microscopic studies they found that water is absorbed through the surface of obsidian, or volcanic glass, from the time it is formed, and seeps deeper into the glass as time passes.

To determine how long it had taken the obsidian to absorb the moisture, the scientists measured this moisture layer in man-made obsidian objects that had already been dated by the radiocarbon method. The results were then used as a measuring stick to date other obsidian objects by measuring the moisture layer on their surfaces, and a new dating method was born.

Obsidian, ranging in color from almost clear to jet black, has been used widely by man from the time he began to shape his own tools, utensils, weapons and ornaments. It holds a good edge and is excellently suited for knife-blades and arrowheads. It also has the advantage of being easy to work, and has been used for scrapers to work skins by Alaskan Indians, as mirrors by the American Indians, and for jewelry and statuary by many ancient peoples, including the Egyptians and Assyrians.

However, since obsidian is somewhat brittle, it was not widely used for hard-hitting weapons, such as axes, although some ancient obsidian axes have been found.

The obsidian method will date objects more than 100,000 years old but much work remains to be done before an exact measuring scale is developed. The rate of hydration, or the time it takes the moisture to form in the surface layer of the obsidian, depends on temperature, the scientists believe. The warmer the climate, the faster the moisture layer will form.

Chemical composition of the obsidian in relation to moisture absorption must also be investigated by the team of scientists, who will do further work on the time-scale of this dating method during the next two years.

Re-use Is Obstacle

In working with man-made obsidian objects that have some of the original surface intact, it is possible to measure both how old the glass is, if conditions under which it was formed are known, and how long ago man worked the surface. However, re-use of objects by several cultural groups might make it difficult to measure

SIX MICRONS EQUAL 3,000 YEARS—This photomicrograph of a thin slice of obsidian shows that the moisture layer on the surface, developed since the glass was formed, is 28 microns deep. Another moisture layer has developed around cracks in the surface, caused by the Ecuadorian craftsman who worked it 3,000 years ago. This layer is six microns deep (a micron is 40-millionths of an inch). The age of the glass itself is not known at present. The time it took the 28-micron layer to form would depend on temperature conditions at the time it was formed.

when they were worked. Faked archaeological "finds" would be easy to detect by this method.

In recent years, the radiocarbon dating method has virtually revolutionized archaeological dating for objects of wood, charcoal, shells, grain and bone up to about 40,000 years old.

As a result of cosmic radiation, radioactive carbon with the atomic weight of 14, instead of 12, that of ordinary carbon, is present in carbon dioxide in the atmosphere. As plants use the carbon dioxide, they absorb the carbon-14. In turn, all animal life, feeding on plant life directly or indirectly, absorbs some of the carbon-14.

When plants and animals die, they stop absorbing carbon-14 and it disintegrates as all radioactive materials do. Eventually it breaks down, and the rate of its breakdown is measured in terms of its half-life. The half-life of carbon-14 is the amount of time it takes for the radiocarbon to be reduced to half the amount that was originally present. As this has been measured to be about 5,568 years, it will take that many years to bring the amount down to one half the original amount and so on. The beauty of this method is that it can be checked on materials of known age and therefore verified. It has been found to work with a fairly small margin of error, although the problems of the method have not been ironed out yet. In some cases, scientists have found different results for samples from the same site.

Chemist and Geologist Help

By finding new ways of dating old objects, the archaeologist with the help of the chemist and the geologist, is able to give nearly accurate historic dates to archaic materials belonging to prehistoric times.

Wooden objects have been dated on the basis of the annual growth rings, whose thickness depends on the amount of moisture the tree absorbs. Sections of trees were fitted together so as to make a "tree-ring calendar." This dating scale has been used mainly to measure wooden beams of ancient constructions as far back as 3,000 years.

Bands in clay deposits from the annual melt-water from the retreating glaciers of the ice ages have also been used as a dating method. In northern Europe this technique has been used to measure back about 12,000 years.

A similar method based on the geological layers of the earth's crust is called stratigraphy. Each layer, or stratum, is known to have a certain time span, and archaeological finds can be dated according to the material in which they are embedded.

Related to this method is dating artifacts by the volcanic ash layers in which they are found.

Trade materials also give clues to the archaeologist. If certain vases of Greek manufacture, known to have been made in a certain century, show up in a buried village on the Baltic, it is probable that the village was occupied about the time of manufacture.

Animal remains found on sites where human remains are found can also give a clue to the date. When remains of horses and mammoths were found together with human remains in Mexico and Arizona, this was evidence that the human remains were at least 8,000 years old because it had already been determined that the animals were extinct in these areas 8,000 years ago.

When the archaeologist wants to determine which bones from a site are the oldest, or if animal and human remains found together are of the same age, he can use the fluorine test. Fluorine from ground water forms fluorapatite in the bones so the oldest bones at any one find would contain the largest amount of fluorapatite.

Even the natural vegetation of an area has been used to tell time. Pollen grains found in utensils where graves or village sites are uncovered give a clue to their place in time. It has been fairly well determined when certain trees and plants could possibly have grown in an area as the four ice ages passed over the earth during the last million years or so. This at least is valid for the Northern Hemisphere.

Science News Letter, May 7, 1960

GEOPHYSICS

Undefined High Altitude Energy Source at Pole

A HITHERTO undefined energy source over the North Pole at high altitudes has been found by Dr. W. W. Kellogg of the Rand Corporation. This newly discovered source of heat is a release of chemical energy stored in atomic oxygen. Despite the darkness of the Arctic winter, at a 60-mile altitude over the North Pole the temperature is 40 to 60 degreees Fahrenheit hotter than during the period of the summer sun. In fact, it is believed to be hotter over the North Pole than over any other portion of the globe at a similar altitude. The cold air over the North Pole at lower levels sucks the upper atmosphere downward, causing some warming by adiabatic compression. But the recombining of atomic oxygen as it moves to a lower altitude creates about ten times the amount of heat as that created by the adiabatic warming.

Science News Letter, May 7, 1960

FORESTRY

Trees on Mine Wastes Reclaim Piled-Up Earth

ONE OF the best ways to reclaim the waste earth piled up from mining excavations is by planting trees on it, the U.S. Department of Agriculture reported. A handbook entitled "Forestation on Strip-Mined Land in the Central States" tells how 20 species of trees can be planted successfully on such land. These include green and white ash, cottonwood, black locust, sweetgum, sycamore, black walnut, yellow popular and several varieties of maple, oak and pine. The booklet, available for 36 cents each through the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., tells which trees will grow best on different types of spoil banks.

Science News Letter, May 7, 1960

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ALUMINUM FROM WATER: The Challenge of Canadian Riverpower — Sabra Holbrook — *Coward-McCann*, 121 p., photographs, $2.75. Picture and word story of an industry.

ANALYTIC GEOMETRY—John W. Cell—*Wiley*, 3rd ed., 330 p., $4.95. Problem material expanded and revised.

THE ANATOMY OF JUDGMENT: An Investigation into the Processes of Perception and Reasoning—M. L. Johnson Abercrombie—*Basic Bks*, 156 p., illus., $4.50. Biologist-educator investigates how psychology can be employed to raise the thinking levels of students.

APPLIED GEOGRAPHY—L. Dudley Stamp—*Penguin*, 208 p., maps, paper, 95¢. Principles of geological survey and analysis as applied to problems of Britain today.

ARMY RESEARCH TASK SUMMARY, 1960, Vol. 1: Medical, Biological, and Social and Behavioral Sciences. Vol. 2: Chemistry. Vol. 3 and 4: Physics (Part 1 and 2). Vol. 5: Engineering. Vol. 6: Materials Technologies, Mathematics, and Operations Research—Wm. J. Ely, Dir.—*OTS*, 387 p., 375 p., 400 p., 400 p., 420 p., 415 p., paper; Vols. 1-4, $3.75 each; $4.25, $4.50. Brief descriptions of research projects.

BIOLOGICAL AND MEDICAL ELECTRONICS—Ralph W. Stacy—*McGraw*, 308 p., illus., $9.50. Text and reference for students, laboratory workers and clinicians.

BORN FREE: A Lioness of Two Worlds—Joy Adamson—*Pantheon Bks*, 220 p., photographs, $4.95. Unusual story by wife of Kenya Game Warden who succeeded in rearing an affectionate, yet wild lioness.

CALCULATION OF BRIGHTNESS OF LIGHT in the Case of Anisotropic Scattering (Part 1)—E. M. Feigelson and others, transl. from Russian by G. B. Rozenberg—*Consultants Bureau*, 104 p., $8.

CHEMICAL TECHNOLOGY OF PETROLEUM—William A. Gruse and Donald R. Stevens—*McGraw*, 3rd ed., 675 p., $15. Covers the chemistry of petroleum and modern methods, standards and practices of petroleum distillation and refining.

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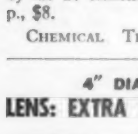

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TECHNICAL COMMUNICATION—George C. Harwell—*Macmillan*, 332 p., $3.75. Textbook for the engineering student.

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TICKS: A Monograph of the Ixodoidea, Part V: On the Genera Dermacentor, Anocentor, Cosmiomma, Boophilus & Margaropus—Don R. Arthur—*Cambridge Univ. Press*, 251 p., illus., $11.50.

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VACATIONS ABROAD: Courses, Study Tours, Work Camps, 1960—*UNESCO* (Columbia Univ. Press), 12th ed., 186 p., paper, $1.25. Information on 1,500 educational and cultural vacation activities taking place in 1960 in more than 75 countries, open to young people, students and teachers.

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THE WHITE SPIDER: The Story of the North Face of the Eiger—Heinrich Harrer, transl. from German by Hugh Merrick—*Dutton*, 240 p., photographs, $6.95. Mountaineering in the Swiss Alps.

WOMEN AND FATIGUE: A Woman Doctor's Answer—Marion Hilliard—*Doubleday*, 175 p., $2.95. Discusses physical and psychological aspects of fatigue.

THE WORLD OF FEELING—J. D. Carthy—*Roy Pubs.*, 64 p., 33 plates, diagrams by W. Tschernezky, $2.50. Acquaints young people with recent research findings about sense organs in animals and man.

Science News Letter, May 7, 1960

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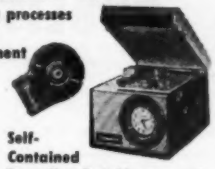

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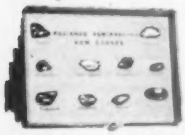

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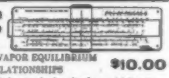

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PSYCHOLOGY

Yes and No Responses Clues to Personality

THE TENDENCY to say "yes" or "no" consistently indicates the nature of a person's personality, it has been reported.

Drs. Arthur Couch and Kenneth Keniston of Harvard University report in the Journal of Abnormal and Social Psychology, 60:151, 1960, that persons who consistently answer "yes" or "true" on questionnaires also tend to be impulsive, dependent and anxious. Persons who habitually disagree and answer "no" or "false" on various tests are responsible, stable persons who control their impulses.

The tendencies of yes-men and no-men were confirmed through tests and clinical interviews. Yes-men were shown to be individuals of weak self-control—who gratify their impulses without reservation and who easily respond to suggestions given them.

No-men, on the other hand, inhibit and suppress their impulses and reject attempts to influence their emotions.

All this may indicate the more profound reasons for the development of the two types of personality, the psychologists report. The implication is that during an early period of personality formation, the two types found opposite answers in regard to certain controls of the self.

Yes-men, still relying on outside control, indulge in the gratification of impulse. The no-men take over the external control of themselves which their parents originally had, and suppress their own impulses.

Science News Letter, May 7, 1960

PUBLIC HEALTH

City Air Too Dirty for Air Conditioning

URBAN AIR is usually so polluted that in an air-conditioned building "the use of outdoor air should be reduced to a practical minimum," an executive told a session of the 1960 Building Research Institute Spring Conference in New York.

Arthur J. Hess, president of Hess, Greiner & Polland, Los Angeles, Calif., said that it is generally better to clean and recycle indoor air than to bring in outdoor air.

Science News Letter, May 7, 1960

Questions

ASTRONOMY—What is the difference between a white dwarf star and a neutron star? p. 292.

PHYSICS—What are magnetic storms and how are they produced? p. 293.

PSYCHOLOGY—What are the origins of man's three brains? p. 291.

***Photographs:* Cover, General Electric Company; p. 291, U. S. Navy; p. 293, U. S. Navy; p. 295, General Electric Company; p. 298, U. S. Geological Survey; p. 304, Fisher Scientific Co.**

HAROLD S. BLACK, LAMME MEDALIST

A MAN WINS A MEDAL... AND STRENGTHENS A PHILOSOPHY

The search for the "hitherto unattainable" sometimes ends in strange places.

For years Bell Laboratories engineer Harold S. Black pondered a problem: how to rid amplifiers of the distortion which unhappily accumulated as signal-transmission paths were made longer and amplifiers were added. There had been many approaches but all had failed to provide a practical answer.

Then one day in 1927 the answer came—not in a research laboratory, but as he traveled to work on the Lackawanna Ferry. On a newspaper, Mr. Black jotted down those first exciting calculations.

Years later, his *negative feedback principle* had revolutionized the art of signal amplification. It is a principal reason why telephone and TV networks can now blanket the country, the transoceanic cable is a reality, and military radar and missile-control systems are models of precision.

For this pioneer achievement, and for numerous other contributions to communications since then (some 60 U. S. patents are already credited to him), Mr. Black received the 1957 Lamme Medal from the American Institute of Electrical Engineers. He demonstrated that the seemingly "unattainable" often *can* be achieved, and thus strengthened a philosophy that is shared by all true researchers.

He is one of many Bell Telephone Laboratories scientists and engineers who have felt the challenge of telephony and have risen to it, ranging deeply into science and technology. Numerous medals and awards have thus been won. Two of these have been Nobel Prizes, a distinction without equal in any other industrial concern.

Much remains to be done. To create the communication systems of the future, we must probe deeper still for new knowledge of Nature's laws. We must continue to develop new techniques in switching, transmission and instrumentation for every kind of information-bearing signal. As never before, communications offer an inspiring challenge to creative men.

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SOLAR MOTOR KIT provides finished parts for a motor that runs on sunlight or artificial light. Designed for science-minded young people, the finished unit demonstrates solar-electric conversion. Powered by a three-cell silicon solar battery, the precision ball-bearing motor spins a propeller on its shaft.

Science News Letter, May 7, 1960

FLEXIBLE MAGNET can be cut and sewn into pot holders and shower curtains to make them adhere to metal surfaces. The non-rusting magnet can also be stapled to a note pad to make it hold to a metal bulletin board or glued in dresser drawers to control bobby pins. Comes in rubbery strips up to 12 inches long.

Science News Letter, May 7, 1960

S-SHAPED TEST TUBE RACKS, shown in the photograph, hold eight test tubes safely. Each rack is a bent, one-piece, anodized-aluminum unit that has no joints or welded edges to pull apart. The racks resist corrosives and may be used in ovens or autoclaves.

Science News Letter, May 7, 1960

ESPRESSO COFFEE MILL grinds fresh coffee beans to a fine powder for espresso coffee, the dark brew served in Europe. An import from West Germany, the mill is electric, has a metal body with baked white enamel finish and clear plastic top. Besides espresso, it produces regular coffee grinds too.

Science News Letter, May 7, 1960

GOLF TUTOR analyzes your swing. Belt a practice ball off the tutor and your club face hits three indicator pins. If the pins fall to the right, you pushed the ball. To the left, you pulled the shot. Pins falling straight along an orange line in the center tell you your follow-through was good. The gadget is aluminum and weighs 12 pounds.

Science News Letter, May 7, 1960

THROW-AWAY FRY PAN. After the fishing and the frying, who wants to wash greasy pans? It is unnecessary with a new holder that turns disposable aluminum pie plates into frying skillets. The holders have metal handles that stay cool.

Science News Letter, May 7, 1960

PLASTIC AUTO VISOR cuts down on summer sun's glare but does not cut out the view. Made of transparent gray plastic, the visor requires no installation. It features a magnet that grips onto metal window molding and it can be moved about to follow the sun.

Science News Letter, May 7, 1960

Nature Ramblings

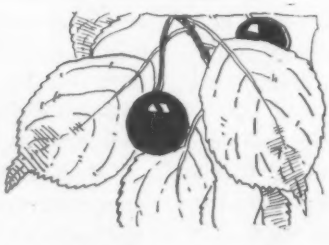
By HORACE LOFTIN

THE SPRING sun shone down brightly. Almost overnight, it seemed, the cherry trees changed from nakedness to a party dress of delicate blossoms and bright green leaves. Winged insects appeared with equal suddenness, carrying loads of pollen from flower to flower. Within only a few days, most of these flowers lost their showy petals, leaving tiny green globes in their stead on the branches—one for each blossom.

These little globes are the new fruits, each containing a seed within its protective covering. As the fruit matures into a tasty, red food for birds and animals, the seed within it will ready itself for germination. Later in the season, some hungry creature may eat the fruit, but the seed will be dropped to the ground. From it will spring a new plant.

True fruits, in the technical sense of the word, are derived from the ovary which surrounds and protects the unfertilized egg in the flower. After the egg is fertilized by a pollen grain, the ovary material comes to form the typical covering for the species.

Fruits of Spring



In the cherry, the ovary develops into three layers: the outer skin, the fleshy interior, and the hard pit or stone covering the seed. Such a fruit is called a drupe or stone fruit. Another kind of "fleshy" fruit is the berry, like the drupe except that no stone is formed. Tomatoes, bananas and grapes are all berries.

There are many "dry" fruits, each with its special name. For example, a legume is a dry fruit that splits along two definite seams, such as the string bean or garden pea. Capsules are dry fruits that split along three or more definite seams. Poppies, lilies, cotton and okra are examples.

Dry fruits that lack definite seams for the escape of seeds include nuts and cereals. In nuts, part of the ovary forms the hard shell and part the outer husk. The seed is the "meat" of the nut. Achenes, including such fruits as the sunflower seed, are made on the general plan of nuts, with a softer covering. Samaras are the winged fruits of such trees as the maple, elm and ash. Cereals have the ovary wall and seed coat fused together.

Perhaps our most favorite fruits are not true fruits at all. In the apple, for instance, it is the unwanted core that comprises the true fruit. The luscious flesh we prize so highly is actually derived from the non-ovarian material of the base of the flower. Watermelons and cantaloupes are also false fruits.

Science News Letter, May 7, 1960